PHOTOPHYSICAL ACTIVITY OF PRODUCTS OF SLOW THERMAL DECOMPOSITION OF 3-NITRO-4,5-DIHYDRO-1,2,4-TRIAZOLE-5-ONE (NTO)

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One of the determining factors of the photoactivity of a substance is its structure, that is, the elemental composition and type of chemical bonds between the elements. In turn, the structure of a substance is determined by the precursors of its synthesis and the mechanisms of chemical reactions that form bonds between atoms. Taking these facts into account, it is possible to try to influence the photoactivity of products by changing the mechanism of chemical reactions of thermal decomposition [1].

In this paper, an attempt is made to obtain carbon-nitride materials (CNMs) with high photophysical activity, which increases as the frequency characteristics of electromagnetic radiation (EMR) from the exposure source decrease. 3-nitro-4,5-dihydro-1,2,4-triazol-5-one (NTO) was chosen as a precursor for the synthesis of CNM, which makes it possible to regulate the structure and, accordingly, the properties of the resulting photoactive material by changing the conditions of thermal decomposition.

The synthesis of photoactive substances was carried out in a nitrogen-containing atmosphere under thermal exposure to NTO until the end of exothermic transformations according to DSC analysis data [2] (Fig. 1). The proposed structure of condensed products of thermal decomposition of NTO was reported in [2]. However, the analysis of the structure of decomposition products is not shown in the work. There is no data on the elemental composition, spectral properties: energy of vibrational states and electronic structure.

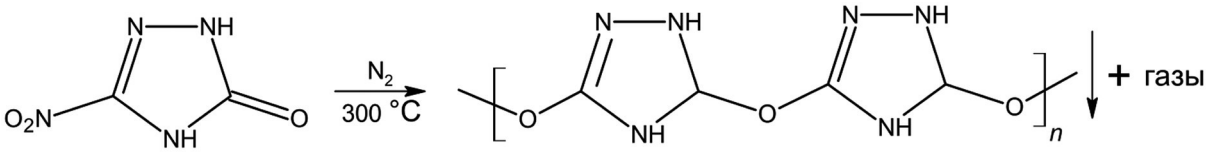

Fig. 1. Production of photoactive substances from NTO

Photoluminescence was measured using laser pumping and recording of the signal reflected from the sample by a CCD detector (Andor). The exposure was performed through a lens with a magnification of 10×. Laser pumping was performed by three sources with a wavelength of 473, 532 and 633 nm, for which the diameter of the laser radiation interaction spot was 45, 30 and 40 microns, respectively.

As a result, the dependence of the elemental composition of the NTO decomposition products on the intensity and magnitude of thermal effects, as well as spectral properties on the elemental composition, was shown.

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